



EBOOK

Satellite Solutions for Defense and Military

Secure, Scalable, Purpose-Built





Satellite connectivity plays a foundational role in today's defense landscape, where situational awareness and real-time decision-making are critical. From force protection to logistics coordination, the ability to securely track personnel and assets, without relying on vulnerable ground-based infrastructure, can determine mission success.

To support this need, military and defense leaders need resilient, secure, and globally available communications designed to operate in the most unpredictable and remote environments.

Designed for Mission Assurance: Selecting the Right Satellite Solution

Not all satellite tracking systems are equal, especially in defense and security. Department of Defense (DoD) and military operations demand technologies that meet rigorous requirements for low probability of intercept (LPI), low probability of detection (LPD), encryption, tamper resistance, and low power consumption. Selecting the right solution means choosing hardware and infrastructure capable of thriving in high-stakes conditions.

Understanding these requirements is essential when evaluating handheld satellite messengers, asset trackers, and integrated IoT solutions for mission-critical defense applications.

These important differentiators are applicable in many use cases



Tagging, Tracking, and Location: Secure Real-Time Monitoring

Visibility is a requirement in modern military operations. Tracing high-value assets across contested terrain, monitoring the movement of tactical vehicles, or ensuring the safety of deployed personnel is vital and supported by Tagging, Tracking, and Location (TTL) technologies that provide the operational awareness that mission success depends on.

But in defense applications, it's essential that tracking solutions balance real-time data with discretion and security.

In tactical settings, the TTL system must do more than simply report coordinates; it must do so with resilience, stealth, and reliability. That's why Low Probability of Intercept / Low Probability of Detection (LPI/LPD) capabilities are foundational. Devices that emit strong or persistent RF signals are more easily detected, geolocated, or even spoofed by enemy forces. TTL platforms designed for defense must minimize their digital signatures and limit transmission patterns in frequency and duration, reducing the risk of operational exposure.

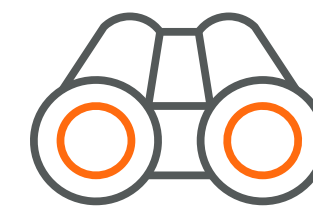
Globalstar's satellite-powered TTL capabilities are explicitly designed with these principles in mind. Operating over a Low Earth Orbit (LEO) satellite constellation, these solutions provide reliable global coverage to ensure that assets and personnel are tracked and monitored in near real-time, even in remote, mountainous, or infrastructure-degraded environments where cellular systems fail or are absent. This continuity is vital for mission assurance, especially in expeditionary, forward-deployed, or denied areas of operation.

Security extends beyond signal discipline. In contested spaces, adversaries constantly seek opportunities to intercept or manipulate data streams. Encrypted communications, tamper-resistant hardware, and secure over-the-air (OTA) update mechanisms are integral to trustworthy TTL solutions. With encryption and device-level authentication, Globalstar's tracking devices ensure that position data cannot be spoofed, altered, or hijacked mid-transmission.

A particularly significant advancement is ground-based validation, which eliminates the need for traditional OTA authentication. In many tracking architectures, devices periodically transmit identifying signals to request authentication from a network. This interaction inherently increases RF emissions, creating a detectable digital presence. With a ground-based validation model, the need for authentication via the air interface is eliminated. Devices remain "dark" until a secure transmission is initiated from a central command element, dramatically lowering the chances of RF detection or intercept. This capability enhances operational stealth during sensitive missions like force protection, personnel recovery, or logistics.

Moreover, low-power operation ensures devices can stay mission-capable for extended periods without recharging or battery swaps. This is critical for long-duration missions or in scenarios where resupply is limited. These attributes make Globalstar's TTL solutions ideal for applications ranging from supply chain integrity and munitions tracking to drone payload monitoring.

Effective TTL for military and defense isn't just about knowing where something is; it's about knowing securely, discreetly, and reliably. The combination of LPI/LPD design, real-time global reach, and tamper-resistant hardware makes Globalstar's satellite-enabled tracking an asset to situational awareness and operational survivability.



Reconnaissance and Surveillance: Intelligence in the Field

Reconnaissance and surveillance (R&S) can manifest in many key ways for military and defense applications: strategic military reconnaissance efforts, surveillance of high-risk zones, and monitoring sensitive infrastructure. What's key to success in these missions is the ability to gather, transmit, and secure real-time intelligence under the most challenging conditions. Satellite-based tracking and communication technologies are vital in delivering this capability, particularly when traditional terrestrial networks are unreliable, compromised, or nonexistent.

Unlike logistics or battlefield comms, R&S missions often operate under unique conditions: extreme remoteness, high risk of signal detection, and adversary efforts to disrupt communications. These missions frequently involve the covert tracking of assets, sensor-driven data collection, or intelligence support for special forces. Maintaining a low digital profile while ensuring uninterrupted data flow is essential in all cases.

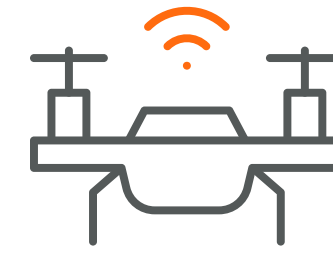
This is where LEO satellite connectivity makes a difference. Because LEO satellites orbit closer to the Earth's surface than geostationary systems, they offer improved latency and more reliable transmission, especially important for real-time applications like motion tracking, remote sensing, or support for unmanned aerial systems. By leveraging an LEO satellite network, intelligence units gain the ability to transmit location, telemetry, or sensor data with speed and confidence, even in terrain-challenged or denied-access environments.



Equally important is the need to minimize radio frequency (RF) exposure. In high-stakes surveillance operations, every transmission has the potential to compromise position or intent. Traditional networked systems – especially those that rely on persistent connectivity or over-the-air authentication – can increase a unit's RF footprint, making them vulnerable to detection, jamming, or geolocation. A well-designed satellite tracking system built for R&S applications limits its transmission patterns, uses secure, intermittent burst data, and sometimes eliminates unnecessary OTA handshakes altogether.

This capability is particularly useful in covert asset tracking scenarios, where beacons or embedded trackers may be attached to vehicles, equipment, or containers. These devices must remain silent unless actively transmitting a location ping, and when they do transmit, it must be encrypted, tamper-resistant communication protocols that are difficult to intercept or spoof. Globalstar's satellite-based tracking solutions are engineered for these conditions, with LPI/ LPD features that reduce operational risk and enhance mission survivability.

In special operations, these trackers also contribute to post-operation intelligence. Location histories, timing of movement, and environmental triggers can all be logged and analyzed securely without requiring a persistent data connection. When paired with other battlefield technologies, like drones, remote sensors, or wearable devices, satellite-enabled tracking enhances the multi-domain situational awareness needed to make informed, time-sensitive decisions.



Unmanned Systems: Secure Satellite Connectivity for Autonomy

Unmanned systems are becoming indispensable across the spectrum of defense operations. From aerial reconnaissance missions to ground-based logistics support and fully autonomous robotic deployments, the DoD, military forces, and national security agencies are rapidly integrating these platforms to improve operational reach, reduce human risk, and increase mission flexibility.

Key categories include:

- ✓ UAVs (Unmanned Aerial Vehicles) for surveillance, target acquisition, and payload delivery
- ✓ UGVs (Unmanned Ground Vehicles) for route clearance, logistics transport, and reconnaissance
- ✓ Autonomous robotic systems for facility monitoring, explosives handling, and perimeter security

Each platform relies on real-time data exchange, remote command and control, and location intelligence. Resilient, secure satellite connectivity is essential for their effectiveness, particularly in beyond-line-of-sight (BLOS) and GPS-challenged environments.

SWaP-C Optimization for Tactical Flexibility

Unmanned systems must be lightweight, energy-efficient, and compact to perform effectively in constrained spaces or dynamic combat scenarios. This is where SWaP-C (Size, Weight, Power, and Cost) optimization becomes critical.

Satellite communication hardware for these platforms must be:

- Small enough to integrate without altering the platform's flight or mobility characteristics
- Energy-efficient to avoid draining onboard power
- Cost-effective for scalable deployment across fleets or formations

Globalstar's satellite modules and embedded solutions are built with SWAP-C requirements in mind, making them well-suited for integration into large tactical UAVs and small handheld robotic units.

Secure Satellite comms for BLOS Operations

The growing use of UAVs and UGVs in BLOS missions requires communication infrastructure that doesn't depend on towers or fixed base stations. Satellite offers a direct uplink capability to support real-time control, telemetry streaming, and health monitoring of unmanned platforms even when operating hundreds of miles from the nearest terrestrial network.

LEO Satellite networks, such as Globalstar's, offer several key benefits, the first of which is low latency to support real-time command and sensor response. Because Globalstar uses LEO networks, the closer proximity to Earth means excellent signal coverage and reliability. This reliable global coverage stands up to hurdles in remote, mountainous, or otherwise challenging environments. Finally, secure data channels support encrypted uplink and downlink for command and control. This level of connectivity gives unmanned systems the flexibility to execute autonomous or semi-autonomous missions in the most unpredictable and infrastructure-poor environments.



Tamper-Resistant GPS and Control Mechanisms

Security is paramount, and unmanned systems operating in contested or adversarial spaces are prime targets for electronic warfare, spoofing, or signal interception.

As such, satellite connectivity solutions must incorporate:

- Tamper-resistant tracking devices with secure OTA authentication
- Encrypted communication protocols to prevent signal manipulation
- Fail-safe mechanisms to ensure loss of GPS or connection does not compromise control

Resilience in GPS-Denied or Congested Environments

The electromagnetic spectrum is increasingly contested. Whether due to deliberate jamming, environmental obstruction, or cyber interference, GPS and conventional RF comms cannot always be relied upon solely. Unmanned systems equipped with satellite-based connectivity have a tactical advantage: they can maintain communications and position reporting even when GPS is degraded or unavailable.

This is especially relevant in:

- Urban combat zones where buildings interfere with line of sight
- Dense forests or underground environments where signal penetration is poor
- Jammed or spoofed operational areas where adversaries aim to disrupt drone operations



Enabling Autonomy, Reducing Risk

Ultimately, the integration of secure satellite communications empowers unmanned systems to operate with greater autonomy. This reduces reliance on constant human oversight and significantly minimizes personnel exposure in high-risk environments. Unmanned systems supported by Globalstar's satellite connectivity can become a force multiplier – increasing operational efficiency, enhancing survivability, and expanding the reach of military and defense.

Use Case

Enhancing Safety and Visibility During Military Land Navigation Training

Military training environments are designed to simulate the unpredictability and intensity of real-world missions. Among the most physically and mentally demanding of these exercises is Land Navigation (LandNav), where soldiers navigate vast, often rugged terrain with limited visibility and minimal support. Ensuring real-time situational awareness and personnel safety during these exercises is essential for trainee well-being, operational oversight, and command readiness.

To support a LandNav training operation, a military unit deployed Globalstar's SPOT Gen4 satellite messengers to each trainee. Compact, rugged, and field-proven, the SPOT Gen4 enabled continuous location tracking and emergency communication, independent of cellular infrastructure. In areas where terrestrial networks were unavailable or unreliable, Globalstar's LEO satellite network ensured uninterrupted connectivity across the entire training zone.

Commanders monitored each trainee's position in real time using an intuitive interface, enabling fast intervention if a participant went off-course, became injured, or failed to check in. The devices also provided an SOS capability, allowing personnel to trigger emergency alerts with precise geolocation data in the event of an incident.

By equipping each soldier with a SPOT Gen4, leadership gained enhanced visibility into individual progress, reduced training risks, and strengthened after-action review capabilities. The result was a safer, more efficient training environment, demonstrating how satellite technology can bridge critical communication gaps in training and operational scenarios.



Key Considerations for Satellite Handheld Devices and Asset Trackers in Defense and Security Applications

Selecting the right satellite-enabled technology is a mission-critical decision in modern defense and security operations. Whether deployed for battlefield logistics, personnel support, or sensitive asset movement, tracking devices must meet strong performance and security requirements. It's not enough for a device to report location, it must do so securely, discreetly, reliably, and without compromising the mission.

Satellite devices and asset trackers used by the DoD, military branches and national security entities must be designed for stealth, endurance, tamper-resistance, and seamless integration with broader defense systems. The following considerations highlight the most important capacities to evaluate when selecting tracking solutions for tactical and strategic deployments.

Secure Tracking with No OTA Authentication Requirements

- ✓ Reduces exposure to eavesdropping, as devices do not need to announce themselves over the air
- ✓ Minimizes RF emissions, lowering the risk of detection and interception
- ✓ Ground-based validation ensures security while eliminating unnecessary device transmissions

Why It Matters

Even a simple OTA authentication ping can compromise operational security in hostile or contested environments. Traditional devices frequently emit signals to confirm identity or maintain network registration, creating detectable RF signatures. By using ground-based validation, satellite devices remain silent unless explicitly tasked to transmit, eliminating unnecessary chatter and reducing vulnerability to eavesdropping or signal triangulation. This approach enhances stealth and situational control, allowing operators to maintain LPI/LPD in mission-critical environments.



Tamper-Resistant tracking for Mission-Critical Assets

- ✓ Devices should have physical tamper-detection mechanisms to alert operators if an asset is compromised
- ✓ End-to-end encryption ensures data integrity, preventing spoofing or manipulation
- ✓ Ruggedized construction protects against harsh environmental conditions and adversarial attempts to disable tracking

Why It Matters

When high-value assets are in transit or deployed in volatile areas, the threat of tampering, whether physical or digital, is real. Devices must be designed to resist sabotage attempts and immediately alert operators if an intrusion is detected. Built-in tamper sensors and encrypted communications help preserve trust in the data being transmitted and maintain control of sensitive materials. Ruggedized housings also ensure that devices can continue operating in extreme environments, from combat zones to arctic climates, without failure or compromise.



Reliable Global Coverage with LEO Satellites

- ✓ Global, uninterrupted tracking with low-latency performance
- ✓ Seamless handoff between satellite signals, ensuring continuous monitoring
- ✓ User data is processed by multiple satellites simultaneously, offering multipath diversity, unlike any other LEO constellation
- ✓ Supports high-mobility applications, including airborne, nearshore, and land-based operations

Why It Matters

Defense operations are increasingly global, mobile, and unpredictable. LEO satellite constellations offer true global coverage, even in regions where terrestrial and geostationary systems struggle. Maintaining uninterrupted connections in motion ensures that assets and personnel remain trackable and secure. Globalstar's unique multipath diversity allows signals to be picked up by multiple satellites at once, improving redundancy and performance in cluttered or contested RF environments.



Affordability and Platform-Agnostic Integration

- ✓ Flexible, cost-effective tracking solutions that can scale across thousands of assets
- ✓ Compatibility with tracking and command systems, reducing integration challenges
- ✓ Modular deployment options, allowing adaptability in various mission environments

Why It Matters

Cost and scalability are critical considerations for defense agencies managing large fleets or distributed operations. Tracking thousands of vehicles, containers, or personnel units demands a cost-effective solution that doesn't compromise performance. Platform-agnostic devices that integrate with existing military networks, command software, and situational awareness platforms reduce training overhead and speed up deployment. With modular options, agencies can deploy the same core technology across multiple mission types and platforms, from drones and convoys to field equipment.



Low-Power, Long-Life Operations for Tactical Applications

- ✓ Designed to operate for extended periods with minimal battery drain
- ✓ No frequent re-registration or network pings, reducing RF emissions and increasing stealth
- ✓ Supports long-duration deployments in remote or congested areas

Why It Matters

Defense missions often extend into weeks or months, with limited opportunity to recharge or replace devices. Satellite trackers used in these scenarios must be engineered for energy efficiency, maintaining functionality without constant attention. Low-power operations not only reduce maintenance but also improve mission stealth by minimizing transmission frequency. These features make satellite devices ideal for deep surveillance, remote logistics, or special operations where long-term autonomy is a tactical necessity.





Supporting Defense and Military through Globalstar Solutions

Globalstar delivers secure, scalable, and mission-ready satellite solutions that meet the evolving needs of today's defense and security operations. From enhancing situational awareness in LandNav training to supporting real-time reconnaissance, unmanned systems, and asset tracking in the field, our technology is built for performance in the most demanding environments. With rugged, low-power hardware, encrypted communication, tamper-resistant designs, and low-latency LEO satellite coverage, Globalstar enables reliable connectivity where it matters most, whether in GPS-denied zones, remote theaters of operation, or high-risk missions. Combined with our support for LPI/LPD principles, ground-based authentication, and global coverage, Globalstar empowers defense agencies to maintain control, visibility, and operational advantage, regardless of terrain or threat environment.

[Reach out to our team of experts to learn more.](#)

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